

REMARKS

Summary on Interview

Applicant thanks Examiner Yuk C. Chow for the telephonic interview conducted on April 14th, 2009. Applicant was represented by Mr. Rex Huang and Mr. Indranil Sarkar.

Applicant's representatives discussed with the Examiner the Koyama reference (US Patent No. 6,597,349) with respect to the rejections under 35 U.S.C. 102(b). Specifically, Applicant's representative pointed out that the level shifter circuit in Koyama only amplifies a voltage level and does not convert a first number of voltage drive levels to a greater number of pixel gray levels. Further, the level shifter circuit is not part of a pixel as clearly shown in Fig. 15 of Koyama. The Examiner concurred with the explanation but noted that further clarifications in the claim language may be required. Applicant's representatives suggested some amendments to claim 1 (recited in the listing of claims above) and the Examiner agreed that the suggested amendments would overcome the prior art rejections under 35 U.S.C. 102(b).

The Silverbrook reference (US Patent No. 5,805,136) was discussed with respect to the rejections under 35 U.S.C. 103(a). Applicant's representative explained that each set of display elements of Silverbrook is driven by a separate dedicated drive line that carries a drive voltage. The nature of the circuit in Silverbrook would therefore not allow generating an *intermediate* grey level corresponding to a drive voltage between two drive voltage levels. The Examiner agreed with the explanation as to how Silverbrook is different from the present application and suggested that the Applicant further clarify the difference in the language of claim 17. Accordingly, Applicant's representatives proposed amendments to claim 17 and the Examiner agreed that the proposed amendments would overcome the prior art rejections under 35 U.S.C. 103(a).

Allowable Subject Matter

The Examiner states:

Claims 10-12, 19-20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent

form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: cited references do not teach or mention applicant's claimed limitation, "divider for dividing by 3 and providing a divisor and remainder" in claim 10 and 19.

Applicant acknowledges that the Examiner has indicated allowance of claims 10-12 and 19-20 if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicant notes that other claims are also patentable for the reasons set forth below.

35 U.S.C. 102

The Examiner rejected claims 1, 4-9 and 13-16 under 35 U.S.C. 102(b) as being anticipated by Koyama et al. (US Patent No. 6,597,349). The Examiner states:

As to claim 1, Koyama discloses an active matrix display, comprising:
an array of pixels provided over a common substrate (see Fig. 10A), each pixel comprising a display element and a switching device (Fig. 10(1002); and
a column driver (Fig. 10(1003)) for providing signals to the pixels for driving the display elements, the column driver comprising digital to analogue converter circuitry (see Fig. 2(208)) and providing a first number of display element drive levels greater than 2,
wherein each pixel comprises means for converting the first number of display element drive levels (Fig. 15(1507) into a second, greater number, of pixel grey levels (see Col. 21 lines 23-35).

Applicant notes that Koyama does not describe and would not have made obvious "each pixel comprises means for receiving the first number of display element drive levels and converting the first number of display element drive levels into a second, greater number, of pixel grey levels," as recited in amended claim 1. The Examiner agreed during the interview that Koyama fails to disclose or suggest at least the foregoing feature of amended claim 1.

Koyama describes a driving circuit of a display in which source signal lines are driven in a time-division manner to decrease the number of D/A conversion circuits and reduce the size of

the semiconductor display device¹. Koyama describes reducing the number of D/A converters, but does not suggest, much less disclose, converting a first number of drive levels to a second, greater number, of pixel grey levels. Therefore, claim 1 is patentable over Koyama.

35 U.S.C. 103

The Examiner rejected claims 2-3, 17-18 and 21-25 as being unpatentable over Koyama in view of Silverbrook et al. (U.S. Patent 5,805,136).

Claim 17

The Examiner states:

As to claim 17, Koyama discloses a method of driving an active matrix display, comprising:

providing first and second drive voltages, the first and second drive voltages being selected from two adjacent drive voltage levels of a digital to analogue converter (Fig. 2(208)) which has more than 2 output levels (Fig. 2(210)).

However Koyama does not teach a display pixel having first and second display elements, within the pixel generating an intermediate grey level corresponding to a drive voltage between the first and second levels.

Silverbrook discloses an intermingling sub-pixels in discrete level display wherein teaches a display pixel having multiple display elements (Fig. 9(36-45)) and intermediate grey level (See Fig. 17, level 2-level 14).

It would have been obvious to one ordinary skill in the art at the time of invention was made to incorporate multiple display element for generating intermediate grey level as in Silverbrook into semiconductor display device of Koyama, because a pixel layout design for a discrete level display providing a interfused arrangement of more intense members (see Col. 2 lines 6-19).

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Response to Arguments

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According to Silverbrook description of generating a "intermediate grey level", 4-bit binary weight (see Col. 5 lines 25-38) is corresponding to drive between first level (lowest 0000) and second level (highest 1111). Therefore, an ordinary skill in art will reasonably interpret "intermediate grey level" as any level between minimum grey level and maximum grey level.

¹ Koyama, *Abstract*

In the Office action dated March 9, 2009, the Examiner acknowledges that Koyama does not teach “a display pixel having first and second display elements” and “within the pixel, generating an intermediate grey level corresponding to a drive voltage between the first and second levels,” but points to Silverbrook as disclosing what is missing in Koyama. Applicant disagrees.

Silverbrook discloses a pixel arrangement in FIGS. 16 and 17 in which each pixel is driven by 4 drive lines that independently drive 4 illumination areas to generate 16 gray levels. The Examiner contends that Silverbrook generates an intermediate grey level between first level (lowest 0000) and second level (highest 1111). However, the lowest 0000 and the highest 1111 do not correspond to “adjacent drive voltage levels of a digital to analogue converter,” as recited in claim 17. Rather, the adjacent drive voltage levels of claim 1 correspond to, e.g., a first level 0000 and a second level 0001 of Silverbrook. Silverbrook does not disclose generating an intermediate grey level between, e.g., levels 0000 and 0001.

Moreover, as the Examiner agreed during the interview dated April 16, 2009, Koyama and Silverbrook do not describe and would not have made obvious “each of the first and second display elements is configured to receive one of the first and second drive voltages,” as recited in claim 17.

In the Office action dated March 9, 2009, the Examiner contends that the transparent electrode areas (e.g., 36-45 of FIG. 9 and 55-61 of FIG. 16) correspond to the “display elements” of claim 17. However, each transparent electrode area of Silverbrook merely receives one bit of a 4-bit signal (e.g., 0000 or 1111). Silverbrook does not disclose or suggest that each transparent electrode area of Silverbrook receive one of the first and second drive voltages (e.g., drive voltages that correspond to 0000 or 1111). Therefore, claim 17 is patentable over Koyama and Silverbrook.

All of the dependent claims are patentable for at least the reasons for which the claims on which they depend are patentable.

Any circumstance in which the applicant has addressed certain comments of the examiner does not mean that the applicant concedes other comments of the examiner. Any circumstance in

which the applicant has made arguments for the patentability of some claims does not mean that there are not other good reasons for patentability of those claims and other claims. Any circumstance in which the applicant has amended or canceled a claim does not mean that the applicant concedes any of the examiner's positions with respect to that claim or other claims.

Please apply \$104 for the excess claim fees and any other charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: April 21, 2009 _____

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